SUSTRAINY
Sustainable action Training for Youth

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SUSTRAINY PROJECT

ENVIRONMENTAL

TOPIC°1

CLIMAT CHANGE

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Introduction to the topic

According to the definition, climate change "are all significant changes that take place in the environment and last for a long time. Climate change includes major changes in temperature, rainfall, etc., as well as other effects that occur over several decades or more"[1]

Rising temperatures result in climate and weather changes. We are increasingly seeing floods, droughts, heavy rainfall, and strong heatwaves caused by climate change in many places on earth. All of these changes will be more visible in the coming decades and will be a big challenge for our society and environment.

As part of the fight against climate change, the EU is working with international partners and pursuing an ambitious policy aimed at reducing greenhouse gas emissions by 2050.

EU legislation and policies:

• **EU Emissions Trading System (EU ETS)** – The main aim is to reduce greenhouse gas emissions from industry, flights, and power sector in the EU.
• Sectors, not belonging to emissions trading, such as transport, buildings, and agriculture, have their national targets.
• Providing CO2 emission standards for vehicles will help in reducing greenhouse gas emissions due to transportation.
• Developing energy efficiency and using renewable energy.
• Managing climate policies and governance of EU energy.
• Implementing innovative low-carbon technologies, which will help us reduce the greenhouse gas emissions.
• Phasing out the fluorinated greenhouse gases, which are contributing to climate warming.
• Conservation of the ozone layer
• Financial help to climate actions. [2]

The main key energy and climate targets:

• **2020 climate and energy package**
• **2030 climate and energy framework**
• **2050 long-term strategy**

The EU is constantly monitoring and controlling progress in reducing greenhouse gas emissions. All activities related to the fight against climate change will require investment, innovation, and research.

1 https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html
2 https://ec.europa.eu/clima/policies/eu-climate-action_en

Chapter 1 Greenhouse gases

1.1 What are greenhouse gases?

Greenhouse gases are components of the earth's atmosphere. They have physicochemical properties that allow them to retain solar energy in the Earth's atmosphere. Greenhouse gases absorb infrared radiation from the planet and are therefore considered to have a direct impact on the greenhouse effect.

Greenhouse gases occur in the atmosphere both as a result of natural processes and in connection with human activity. Greenhouse gases affect the greenhouse effect in different ways and have an impact:

- Absorption rate, i.e. the ability of a substance to absorb infrared radiation
- The lifetime of this substance in the atmosphere.

These factors also determine the global warming potential (GWP), in other words, they determine the potential for creating the greenhouse effect. The determination of this indicator depends on the amount of heat absorbed by a given gas of a certain weight. It is then compared with the amount of heat that a substance absorbs through the same mass of carbon dioxide. The GWP for carbon dioxide is 1 and from it the GWP for other substances is calculated.

1.2 Types of greenhouse gases

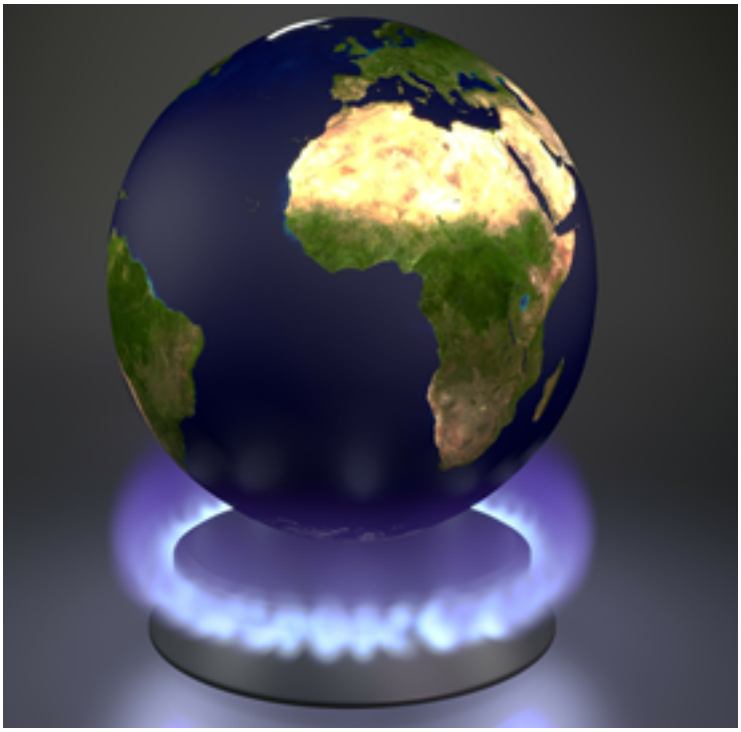
Gases impacting on the greenhouse effect:

• **Steam -** Steam has the greatest impact on the greenhouse effect. Its content in the earth's atmosphere is very diverse and ranges from 40 to 95, depending on the cycle of water circulation in the environment (evaporation, condensation, sublimation, and resubmission). Steam is 95% responsible for the greenhouse effect, and its presence in the atmosphere is almost completely independent of human activity.

• **Carbon dioxide -** The presence of carbon dioxide in the air is a natural phenomenon because, among other things, it is released when breathing and taken during photosynthesis. Unfortunately, since the industrial revolution, the concentration of this gas in the atmosphere has increased from less than 10% to about 30%. This is happening mainly in highly developed countries, because carbon dioxide is the result of burning large quantities of fossil fuels.

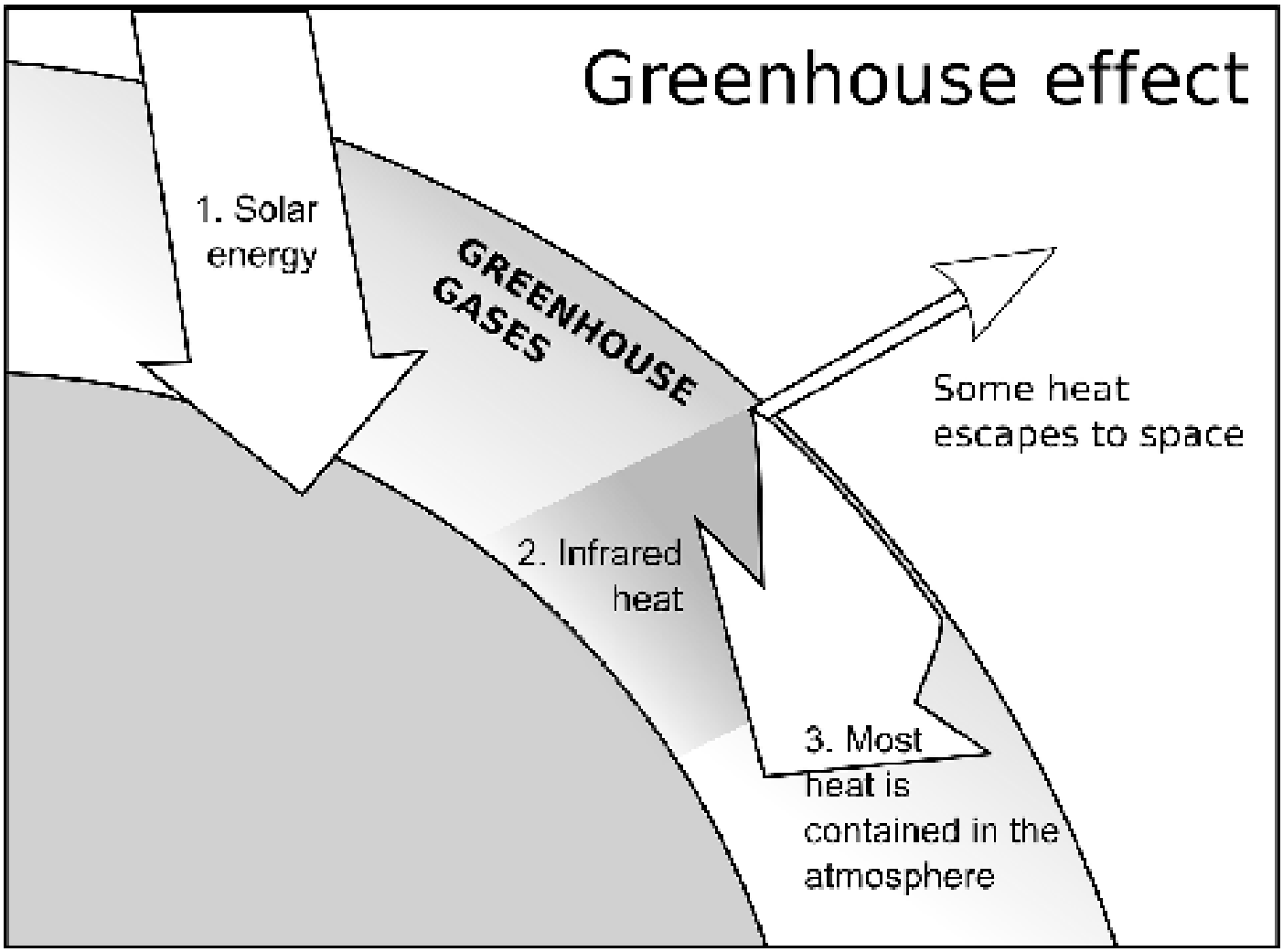
• **Methane -** is another greenhouse gas, which is produced both by natural processes and by human activity. It is produced naturally by anaerobic processes, but is also formed in termites, swamps and oceans. Methane retains heat much more than carbon dioxide, but its duration is shorter so it is less present in the atmosphere.

• **Fluorinated greenhouse gases (HFCs)** - Are mainly produced in industrial processes. They do not arise naturally. Human activity contributes to their formation. They are a serious threat to the environment because they have a high capacity to bind heat and remain in the atmosphere for thousands of years.



1.3 Types of greenhouse gases

Some of the greenhouse gases have been present in the Earth's atmosphere for millions of years and are a natural component of it. They have enabled the Earth's climatic conditions in which life has developed. The factor exacerbating the greenhouse effect are unnatural gases which have appeared in the atmosphere due to human activity.



Solar radiation (UV - shortwave) reaches the Earth in some parts. In most cases, it is absorbed or reflected by the upper atmosphere. UV radiation mainly reaches the earth's surface, warming it up. The Earth emits heat in the form of infrared waves, which are then absorbed by the greenhouse gases and thus are not released into space, but spreads in different directions, causing the greenhouse effect.

1.4 Activities for reducing greenhouse gases

Good practice 1 – Nestlé

In 2019, Nestle announced its intention to achieve zero greenhouse gas emissions by 2050. This commitment includes a key objective of the Paris Agreement - to limit the temperature increase to a maximum of 1.5°C. Over the last 4 years, Nestlé has acted in such a way as not to contribute to a temperature rise above 2°C. The company is determined to play a leading role in the fight against climate change. Over the next two years, Nestlé will develop a plan with interim targets along the 1.5°C paths. The company will monitor its progress to ensure that it is on the right track. To do so, the company will take the following steps:

- Accelerating the transformation of the product portfolio in line with consumer trends,
- More initiatives to target farmers to absorb more coal,
- Using 100% renewable electricity in Nestlé factories, warehouses, logistics and offices.[1]

Good practice 2 – Eco-design

Since 2007 Diehl Metering has been implementing eco-design to develop new products. Eco-design aims to integrate the environmental impact of products in other projects (production, distribution, etc.). The company has replaced brass, which has traditionally been used in the production of meter housings, thus reducing the carbon footprint of the meters. The extraction and processing of brass itself consume a lot of energy and the result is comparable. The composite material created by the company is lighter than brass, which has a positive effect on the transport of products. A lighter load does not require a large amount of fuel, which is conducive to reducing greenhouse gas emissions.[2]

1 ttps://www.nestle.pl/media/pressreleases/allpressreleases/nestl%C3%A9-przyspiesza-dzia%C5%82ania-w-celu-przeciwdzia%C5%82ania-zmianom-klimatu-i#

2 https://www.diehl.com/metering/pl/firma/odpowiedzialno%C5%9B%C4%87-spo%C5%82eczna/reducing-greenhouse-

Chapter 2 Deforestation

2.1 Definition of deforestation

Deforestation is a process that contributes to the reduction of forest area. This process is caused by excessive logging and burning of forests. The problem of deforestation is present all over the world, but it is most noticeable in the tropics. Our forests are felled and burnt down to provide shelter and other basic human needs. Felled trees are converted into paper, furniture, charcoal, etc.

Deforestation also contributes to greenhouse gas emissions, about 20% of greenhouse gas emissions are due to the burning of tropical gases, which contributes to global climate change. By felling or burning trees, areas are created that are devoid of vegetation, which makes the earth heat up faster and harder. The absorption of solar radiation is also increased, and water evaporates faster.

2.2 Causes of deforestation

The main causes of deforestation:

• **Agriculture -** one of the main factors contributing to deforestation is agricultural activity. This is due to the high demand for food, which is why more and more space is being used for growing crops and grazing cattle.

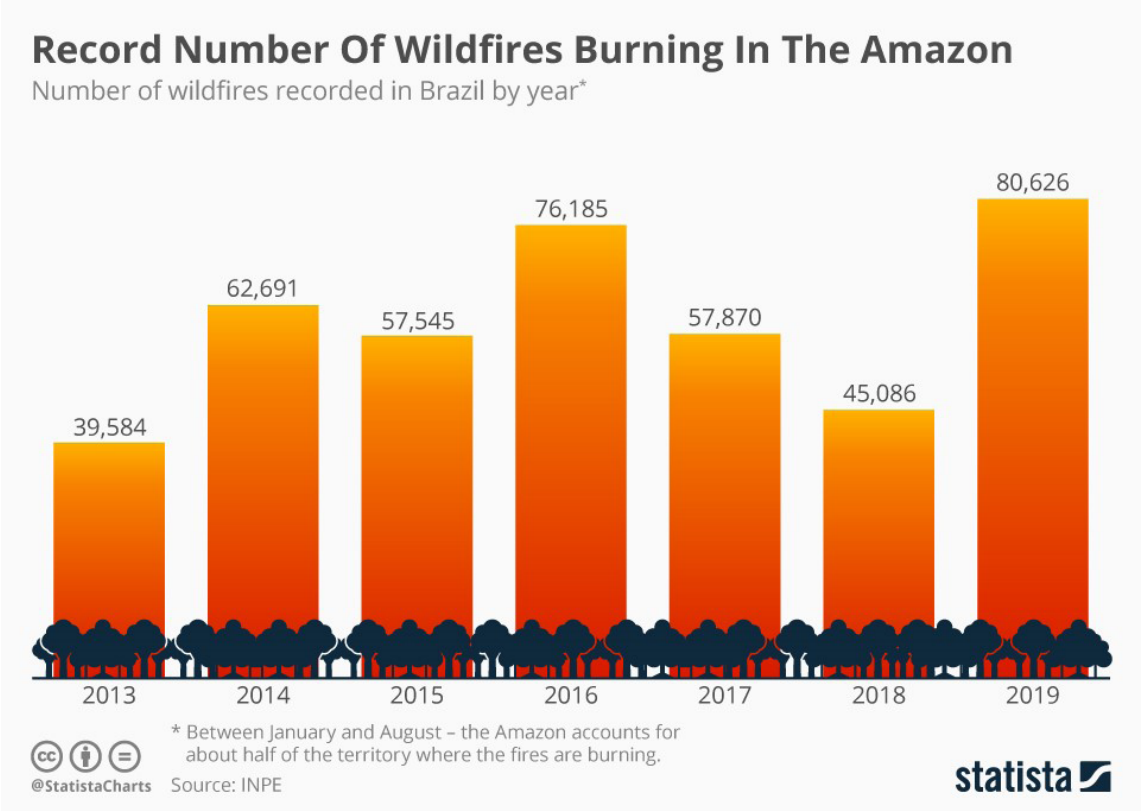
• **Logging -** trees are used in the wood and paper industry, to make matches, furniture, etc. Wood is also used to produce firewood. Many industries are developing through illegal logging and felling.

• **Urbanization -** to access the forests, roads are built; here too, trees are chopped up to create roads. Overpopulation is a factor that affects deforestation. Population growth results in greater demand for land, because people need it to build houses, settlements and so on.

• **Deserification of land -** this process occurs partly naturally. The earth that is over-exploited is not suitable for tree growth. Many companies and factories throw their waste into rivers, which causes soil erosion, making it unfit for plant and tree cultivation.

• **Mining -** oil and coal mining requires a significant amount of forest land. This waste pollutes the environment and affects nearby plant and tree species.

• **Forest fires -** Fires in the forest cause the extinction of tree species in different parts of the world. The reason for the fires is a warm summer and milder winter. Fires cause enormous damage to the forest and the environment, both to man and nature.



Source: https://www.statista.com/chart/19089/number-of-wildfires-recorded-in-brazils-amazon-rainforest/

2.3 Consequences of deforestation

• **Climate imbalance** - The shade provided by the trees keeps the gelba moist and contributes to the release of water vapor in the air. Deforestation causes an imbalance in the atmospheric temperature. Some animal species have to leave their habitats through tree felling. It is very often the case that they have difficulty in surviving and adapting to new habitats.

• **Increase in Global Warming** - Trees use greenhouse gases and restore the natural balance of the atmosphere, which makes them very important in controlling global warming. Deforestation increases greenhouse gases, which contributes to global warming.

• **Soil erosion** - Deforestation contributes to the exposure of the soil, which is exposed to direct sunlight, causing the soil to dry out.

• **Floods** - The trees have the ability to absorb and store rainfall. Deforestation disrupts water flow and leads to flooding in some areas and drought in others.

• **Wildlife Extinction** - Deforestation contributes to the extinction of animal species. Many different species of both plants and animals have become extinct in the last few decades. [1]

1 https://www.conserve-energy-future.com/causes-effects-solutions-of-deforestation.php

2.4 Deforestation – good practices

Good practice 1 – PEFC Pan-European Forest Certification

PEFC Pan-European Forest Certification - (Programme for the Endorsement of Forest Certification Schemes) Its main objective is to promote sustainable forest management through certification by entities independent of government and business. Enterprises which receive the PEFC certificate are enterprises whose producers observe the highest ecological, ethical and social standards. The PEFC is a global organisation established for the assessment and mutual recognition of national certification schemes developed by many stakeholders, taking into account local specificities. Each national certification scheme must be examined and met with the approval of another country to participate. PEFC certificates are granted in more than 30 countries and cover 230 million hectares of forest (2/3 of the world's certified forests). [1]

Good practice 2 – Plant a billion trees

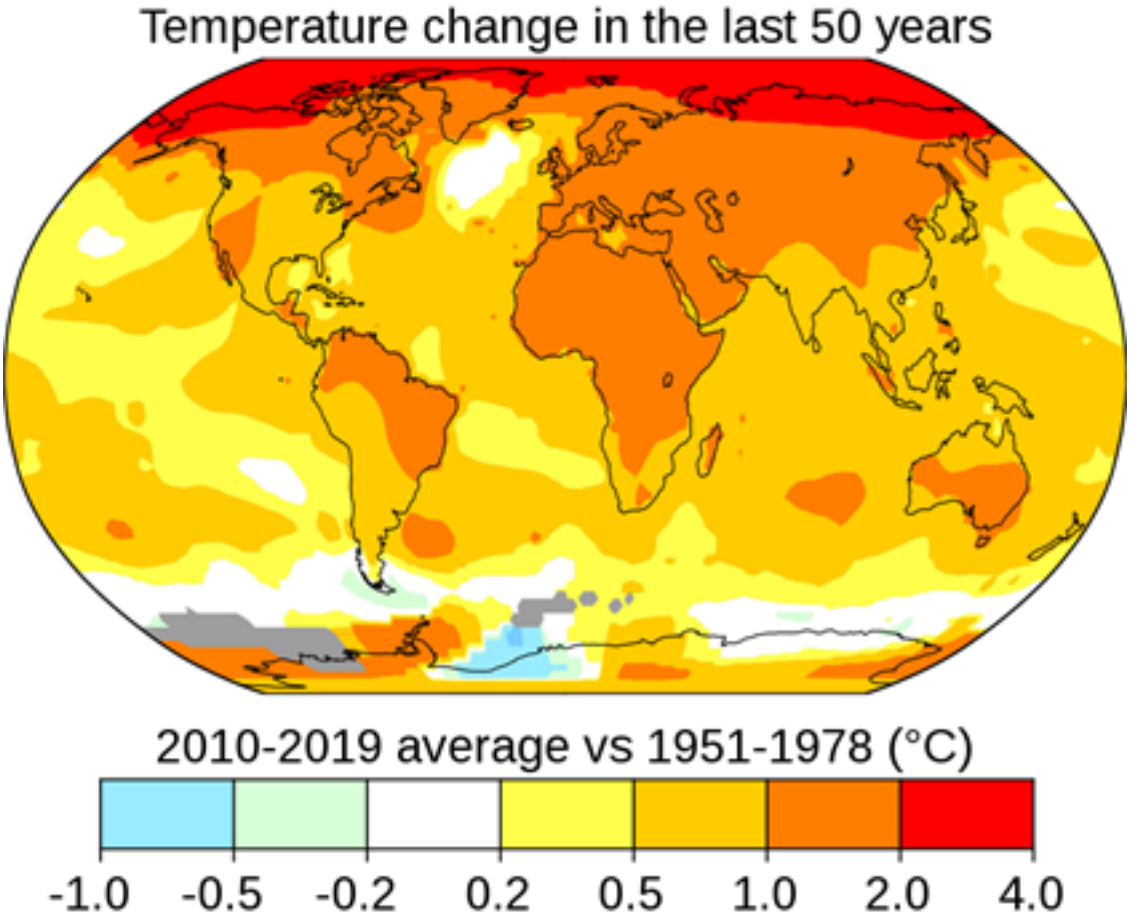
In 2008, the Nature Conservancy created the "Plant a bllion trees" campaign. Initially, the campaign was aimed at rebuilding the Atlantic forest in Brazil. Now the campaign has expanded its activities and is engaged in rebuilding forests in the United States and China. Through its activities, the campaign helps to ensure clean air, a variety of species and full and healthy forests for future generations. [2]

1 https://www.pefc.org/
2 https://www.nature.org/en-us/get-involved/how-to-help/plant-a-billion/

Chapter 3 Evidence for rapid climat change

3.1 Global temperature rise

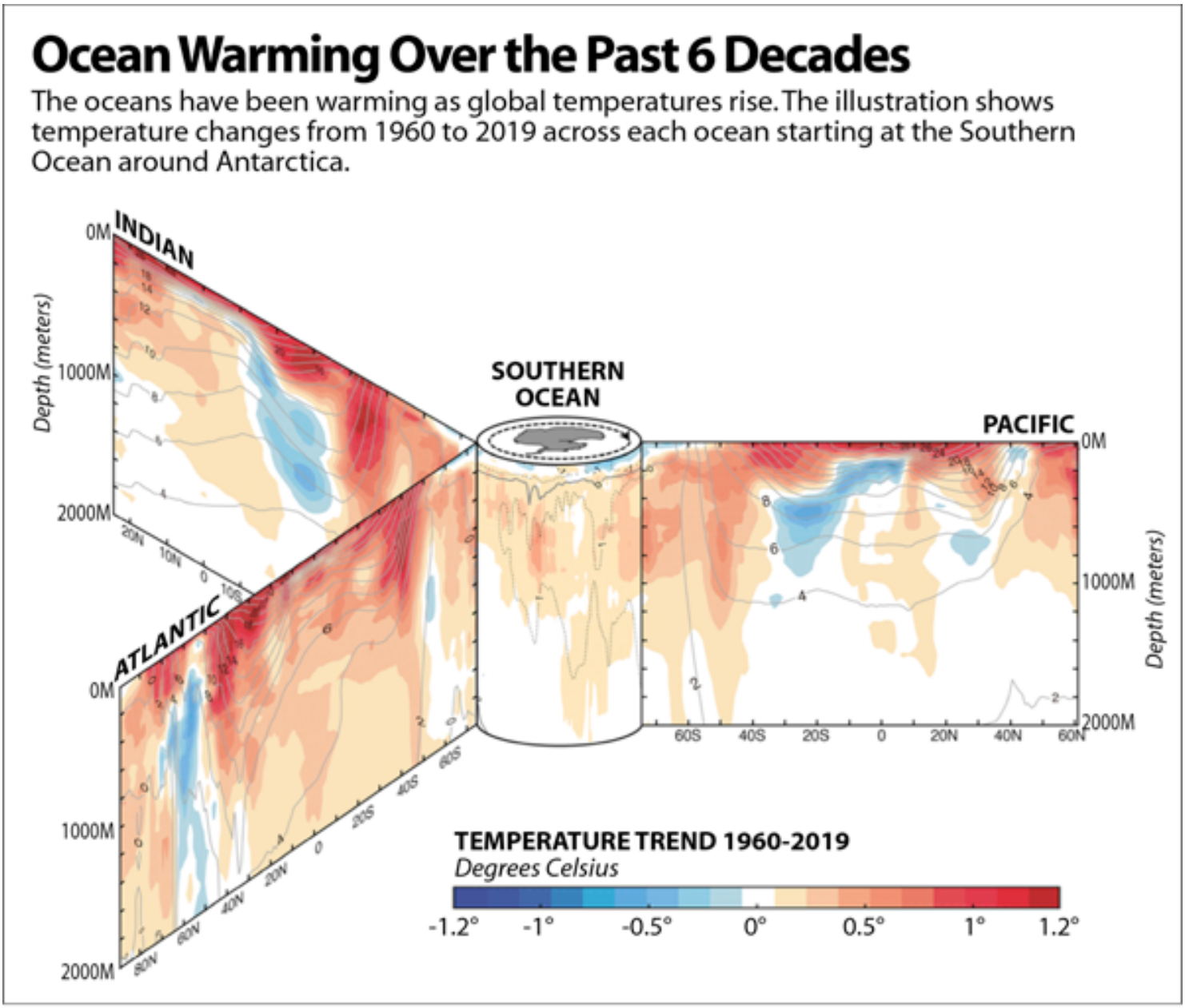
Increased emissions of carbon dioxide and other greenhouse gases into the atmosphere are increasing the average temperature of the planet. The sharp rise is mainly due to human activity. Today we are witnessing dynamic climate change. The picture below shows how the temperature has changed over the last 50 years.



Source: **NASA**

3.2 Warming oceans

Increased temperatures also have an effect on warming the oceans. This is because the oceans absorb part of the increased heat. Below is a picture of how the oceans have warmed up over the last 6 decades (Levitus,S et all, 2017).

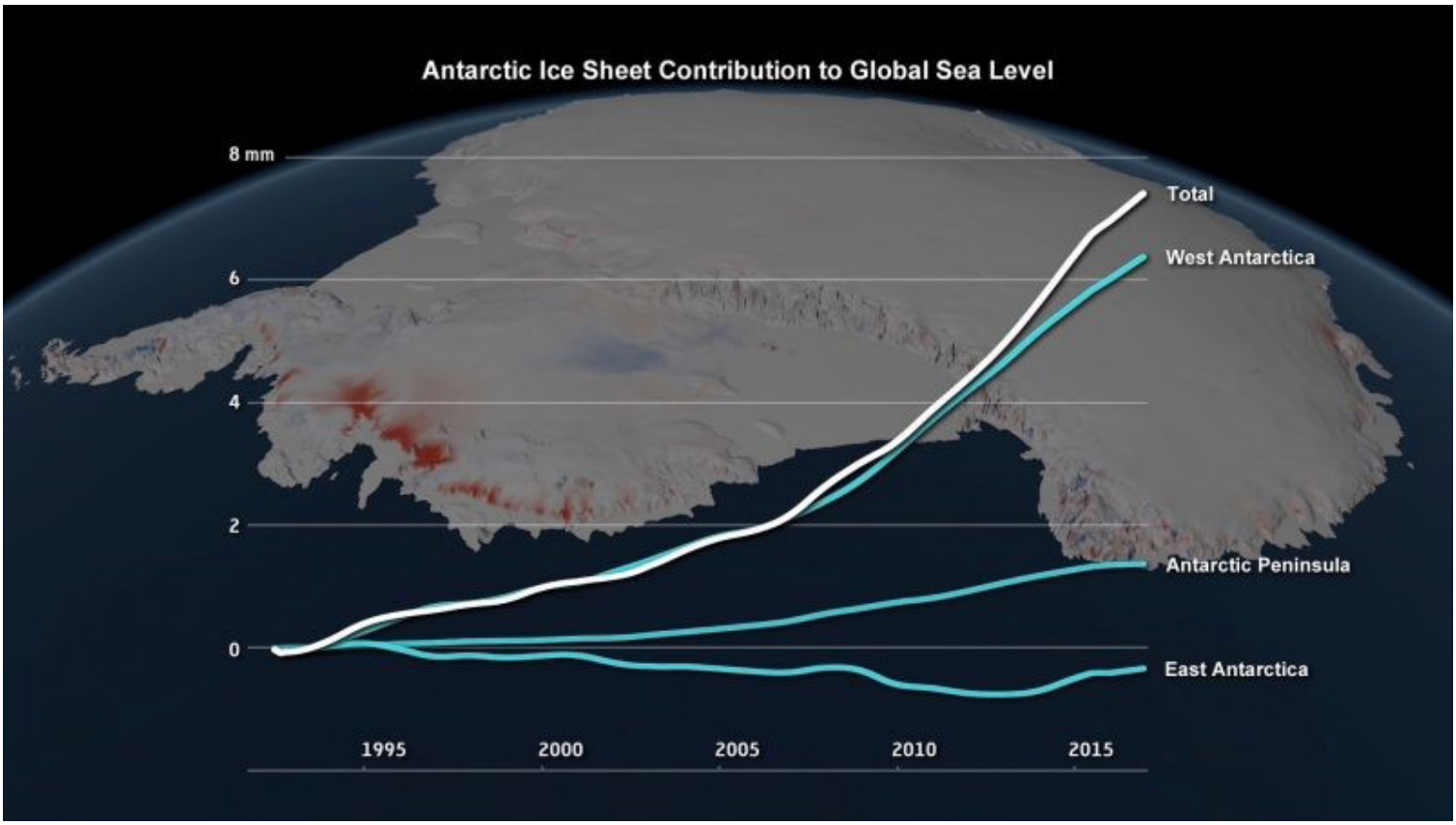


Source: https://insideclimatenews.org/news/14012020/ocean-heat-2019-warmest-year-argo-hurricanes-corals-marine-animals-heatwaves

3.3 Shrinking Ice Sheets

The Greenland and Antarctic ice coats have reduced their weight. Data from NASA's gravity and climate experiment show that between 1993 and 2016 Greenland lost an average of 286 billion tonnes of ice per year, while Antarctica lost about 127 billion tonnes of ice per year during the same period. The rate of ice mass loss in Antarctica has tripled over the last decade.[1]

1 https://www.jpl.nasa.gov/news/news.php?feature=7159



Source: https://earthsky.org/earth/ice-losses-antarctica-speed-up-sea-level-rise

3.4 Climat change – good practices

Good practice 1 – renewable energy

Renewable energy has great potential and brings many benefits. Among other things, it contributes to the reduction of greenhouse gas emissions, the diversification of energy supply and the reduction of fossil fuels (in particular oil and gas). Renewable energy sources also contribute to stimulating employment in the EU (creating new jobs in green technologies). Almost 50 countries exposed to drastic climate change have agreed to produce 100% renewable energy by 2050 and the rest of the world is actively developing solar, wind and geothermal energy.[1]

Good practice 2 - Energy Label

With energy labels, consumers can choose a product that uses less energy, thus saving money. Labels can also encourage companies to invest in developing energy-efficient products. Energy labels show how much energy a device you sell or produce consumes, on a scale from A to G. Class A (marked green) means the lowest consumption and class G (red) the highest. [2]

1 https://www.plattsinsight.com/insight/insight-magazine-apr-2020/?gclid=Cj0KCQjwupD4BRD4ARIsABJMmZ_rlx-N3O-ElSiEkrJF9jcGzwOmuncXLcUSOeP1d7Uo8kTgCuI_vAnoaAmsiEALw_wcB

2 https://ec.europa.eu/energy/topics/energy-efficiency/energy-label-and-ecodesign/energy-label-generator_pl

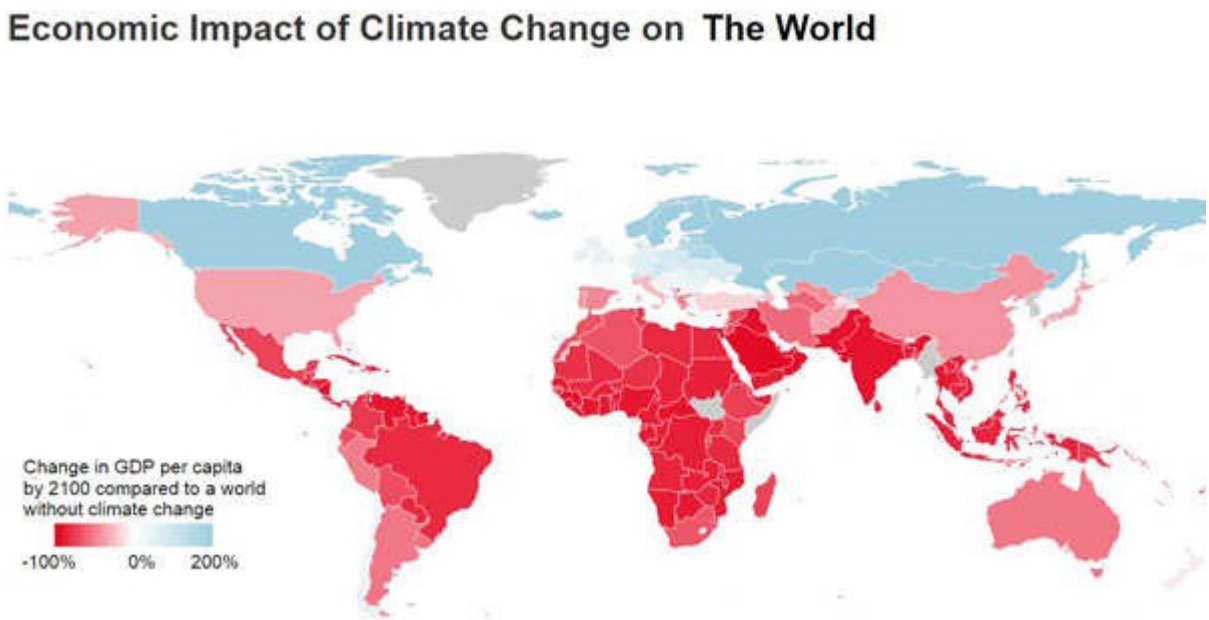
Chapter 4 Impact on society

4.1 Communities

Global warming and its effects are felt in communities around the world. Increasingly frequent and intense weather and climate events are destroying our infrastructure and ecosystems that provide various benefits to communities. Future climate change is likely to cause many disruptions to you and community life. People on lower incomes have fewer opportunities to prepare for extreme weather and climate events. Global action to significantly reduce greenhouse gas emissions can significantly reduce climate risks and increase opportunities for these communities in the long term.

4.2 Economy

Rising temperatures, rising sea levels and extreme events will increasingly disrupt and destroy infrastructure, productivity and the vitality of our communities. Regional economies and industries dependent on natural resources and favourable climate conditions (e.g. agriculture, tourism and fisheries) are very vulnerable to climate change. Increased temperatures will reduce the efficiency of electricity production, but energy demand will be even higher, increasing the cost of electricity. Climate change will have a major impact on trade and the economy. With the steady increase in greenhouse gas emissions, annual losses in some sectors are projected to reach hundreds of billions of dollars by the end of the century.



Source: Marshall Burke, Solomon M. Hsiang, Edward Miguel, “Global non-linear effect of temperature on economic production,” Nature.

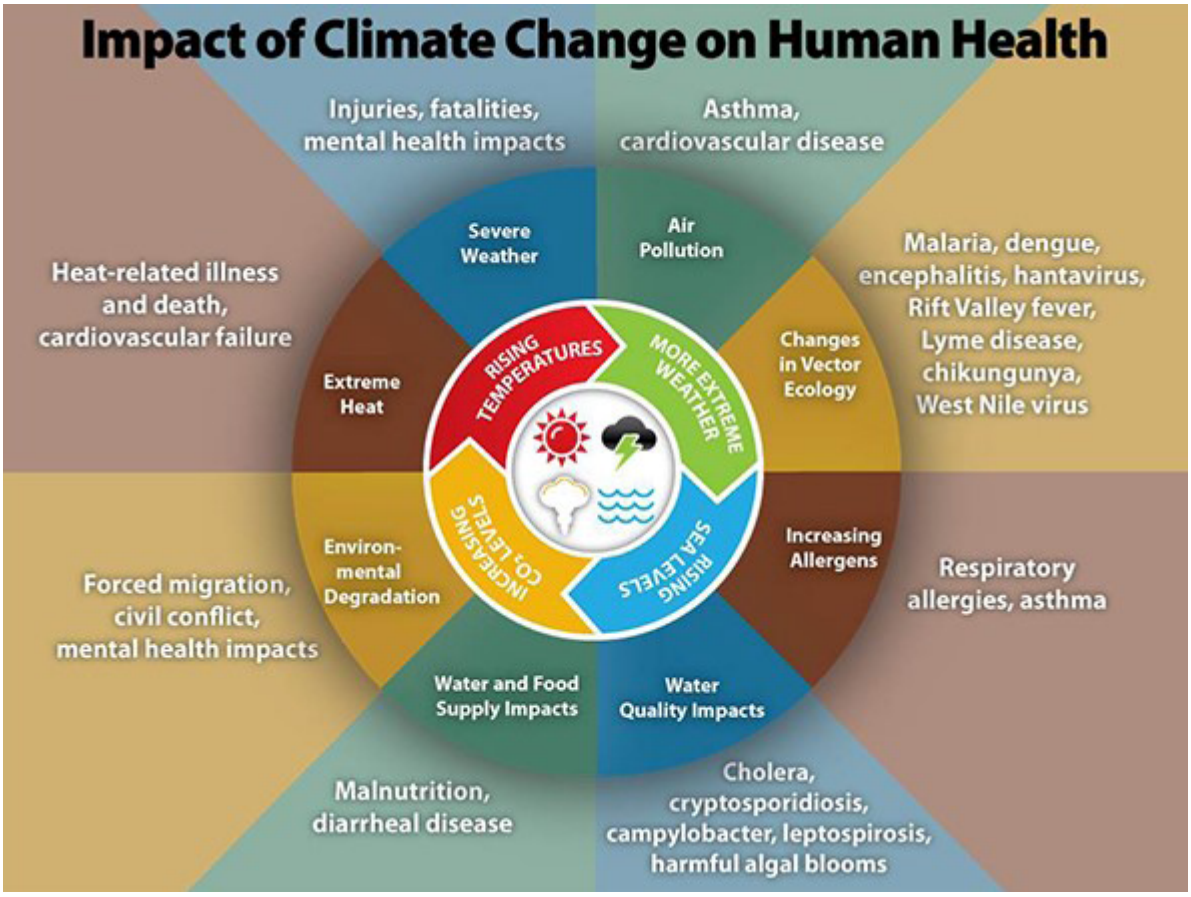
4.3 Health

Rising temperatures and precipitation change air quality increase health risks. Rising air and water temperatures and various intense extreme events will increase the number of diseases transmissible by food or water, which will affect food and water safety.

As warming increases, the number of deaths caused by cold will decrease and the number of deaths caused by heat will increase. The number of deaths caused by heat is expected to be greater than the decrease in the number of deaths caused by cold. The frequency and severity of allergic diseases, including asthma and hay fever, will increase.

Climate change will also cause the distribution of insects and disease-carrying pests. More people will be exposed to ticks that carry Lyme borreliosis and mosquitoes that carry viruses such as Zika, West Nile and Dengue. Extreme weather events can also have an impact on mental health, particularly when they lead to degradation of livelihoods.

Adaptation and mitigation policies and programmes that help individuals, communities and countries prepare for the risks of climate change are reducing the number of injuries, diseases and deaths from climate-related health effects.



Source: https://www.cdc.gov/climateandhealth/effects/default.htm

4.4 Impact of society – good practices

Good practice 1 – WHO

The WHO European Regional Office for Europe is working to identify policy options to help prevent, prepare for and respond to the health impacts of climate change and is supporting Member States in selecting and implementing the most appropriate policies, actions and strategies. The Office supports Member States by building capacity to develop early warning and surveillance systems and to develop and run targeted campaigns to address the immediate and distant health consequences of climate change. [1]

Good practice 2 - Network for Greening the Financial System.

Central banks and financial supervisors in various countries are trying to develop principles for testing the resilience of banks and other financial institutions to climate change and encourage them to provide green credit. To achieve these objectives, eight central banks and supervisors have set up in 2017. Network for Greening the Financial System. The network currently comprises 42 institutions on five continents. Among them is the German Central Bank, which is conducting a programme to review strategies to support sustainable investment and is working on the next guide on greening financial markets. [2]

1 https://www.who.int/about/who-we-are/regional-offices
2 https://www.dnb.nl/en/about-dnb/co-operation/network-greening-financial-system/index.jsp

Chapter 5 Response options

5.1 Mitigation

Mitigation - efforts to reduce greenhouse gas emissions. The climate has changed irreversibly, our planet will continue to warm up due to past emissions. The climate impact is inevitable, but there are ways to mitigate it. What can we do to reduce greenhouse gas emissions and contribute to environmental protection? Here are some examples:

• Buy energy-Efficient Products - Many household appliances are available in energy-efficient models. For example, compact energy-saving light bulbs are designed to provide natural-looking light, with significantly less energy consumption than standard light bulbs.

• Use the 'Off' Switch - Save your electricity! Turn off the light when you leave the room, remember to turn off the computer.

• Reduce, Reuse, Recycle - Buy products that do not have large packaging, so you will contribute to reducing waste.

• Plant a tree - If you have the right conditions, plant a tree. The trees absorb carbon dioxide and release oxygen. A single tree will absorb about one tonne of carbon dioxide during its lifetime

5.2 Adaptation

Adaptation through climate impact planning and resilience. Adaptation will help to reduce the damage associated with climate change and will also help to deal with existing threats from current weather trends, natural and human-made disasters. Adaptation has limitations and disadvantages. Some climate impacts may be too large to be addressed through adaptation.

Implementation of adaptation policies requires consideration of location-specific factors, as the effects of climate change may vary from one geographical location to another. As a result, centralised policy action may be somewhat more limited for adaptation than for mitigation or geoengineering.

5.3 Geoengineering

Geoengineering is deliberate manipulation of the climate system. The purpose of geoengineering is to counteract the effects of greenhouse gas emissions by humans or their effects. Geoengineering has the potential to help reduce the concentration of greenhouse gases in the atmosphere, to counteract the physical impact of an increase in the concentration of greenhouse gases, to counteract specific effects of climate change or to offer strategies when sudden, catastrophic or otherwise unacceptable effects of climate change become evident.

5.4 Response options – good practices

Good practice 1 – Nike

Nike has created the “Nike Better World” campaign to promote recycling. The company stresses that recycling, like sport, can change our lives for the better. Nike uses used materials to create new sports shoes. The company has also introduced new shipping packaging, which is produced with limited carbon emissions, from FSC-certified material, which means the box is recycled and the wood comes from properly managed forests.

Source: https://dailyweb.pl/nike-space-hippie/

Good practice 2 – TCF and PCF

TCF (Totally chlorine-free bleaching), PCF (Processed chlorine-free bleaching) - the use of chlorine for paper bleaching can lead to the formation of toxic and carcinogenic dioxins and furans. Therefore, chlorine-free paper bleaching and processing technologies have been developed and are referred to as TCF or PCF.

Source: https://www.upmraumaceII.com/newsroom/2019/03/your-natural-choice-our-tcf-fluff-pulp-bleached-without-any-chlorine/

Chapter 6 JOIN THE MOVE

Existing networks and supporting programmes

http://www.climatenetwork.org/ - Climate action network

https://ec.europa.eu/clima/policies/eccp_pl - European Climat Change Programme

Tools of reference to develop actions

https://www.climatelinks.org/resources/agriculture-and-land-use-national-greenhouse-gas-inventory-alu-software - Agriculture and Land Use National Greenhouse Gas Inventory (ALU) Software

http://www.afolucarbon.org/ - Agriculture, Forestry, and Other Land Use (AFOLU) Carbon Calculator

https://cgspace.cgiar.org/handle/10568/67027 - CCAFS Mitigation Options Tool (CCAFS-MOT)

https://www.cleertool.org/ - Clean Energy Emission Reduction (CLEER) Tool

https://www.globalforestwatch.org/ - Global Forest Watch (GFW) and GFW Climate

https://www.i-jedi.org/index.html - International Jobs and Economic Development Impacts (I-JEDI)

Recommendations:

• Increasing the capacity to adapt to climate change risks and natural disasters in all countries of the world.

• Introducing climate change-related measures into national strategies and policies.

• Raising awareness and competence in relation to climate change mitigation. Climate change mitigation and prevention.

• Enhancing capacity for effective climate change planning and management. [1]

1 https://www.un.org/sustainabledevelopment/climate-change/

Quotes from entrepreneurs or youth having taken relevant actions:

"Climate change is the greatest threat to our existence in our short history on this planet. Nobody's going to buy their way out of its effects." - Mark Ruffalo, Actor & Environmentalist

"I hope to use my celebrity to motivate people and contribute to moving our global society back from the brink. I am surprised environment is not at the top of the agenda. What is more important than good and clean air?" -Don Cheadle, Actor & UN Environment Goodwill Ambassador

"It's important for me to have hope because that's my job as a parent, to have hope, for my kids, that we're not going to leave them in a world that's in shambles, that's a chaotic place, that's a dangerous place." - James Cameron, Film Director

"Let's double down on solar energy, let's be more energy-efficient, let's weatherize our homes. We can build a better, healthier economy based on good-paying, clean energy jobs." - Ian Somerhalder, Actor

Chapter 7 TO GO FUTHER

https://climate.nasa.gov/evidence/ - Climat change – How do we know?

https://climatepolicy.org/index.cfm/climatepolicy/the-basics/there-are-many-possible-policy-responses/ - Possible policy responses

https://www.globalchange.gov/climate-change/response-options - Response options

http://www.eastgwillimbury.ca/services/Environment/Ten_ways_to_Reduce_Greenhouse_Gases.htm?PageMode=Print – 10 ways to reduce Greenhouse Gases

https://www.conserve-energy-future.com/phenomenal-ways-to-stop-deforestation-and-protect-our-planet.php - 15+ Phenomenal Ways To Stop Deforestation and Protect Our Planet

https://www.conserve-energy-future.com/causes-effects-solutions-of-deforestation.php - Deforestation: Compromises of a Growing World

https://www.environment.gov.au/climate-change/climate-science-data/climate-science/greenhouse-effect - Greenhouse effect

https://www.yaleclimateconnections.org/2019/10/12-major-climate-change-reports-from-2019/ - 12 major climate change reports from 2019

Chapter 8 PRACTICAL ACTIVITIES

8.1 How many CO2 do you utilize?

Analyse energy consumption of a hypothetical household and determine the amount of carbon dioxide you are adding to the atmosphere each year.

Here, you can find a template, which will help you to calculate how much CO2 you utilize in a month and in a year: **https://scied.ucar.edu/sites/default/files/images/activity/co2_spew.pdf**

8.2 Quiz

1. Greenhouse gases are components of the Earth's Atmosphere
a. Yes
b. No

2. The main causes of deforestation are:
a. Temperature
b. Logging
c. Agriculture
d. Atmosphere

3. The average surface temperature of the planet has:
a. Increased
b. Decreased

4. Does global warming have an impact on the society?
a. Yes
b. No

5. What are the response options?
a. Mitigation, Adaptation, Agriculture
b. Geoengineering, Deforestation, Geoengineering
c. Mitigation, Adaptation, Geoengineering

Conclusion: This is a beginning - My action

We've given you some advice; now it is time to turn this info into action… your action!
Write here your own remarks:

Conclusion: This is a beginning - My action